

User Guide

FlatMesh Optical Displacement Node

FM3N-LDS-IX
FM3N-LDS-IXH



1.00

Contents

Warnings	ii
1 Overview	1
1.1 The FlatMesh System	1
1.2 FlatMesh Optical Displacement Node (ODS)	1
1.2.1 FM3N-LDS-IX(H) Physical Specification	2
1.2.2 Internal Battery	2
1.2.3 FlatMesh Radio Specifications	2
1.2.4 Optical Displacement Sensor Specification	3
1.2.5 Tilt Sensor Specification	3
2 Installation	4
2.1 Mounting	4
2.2 Targeting	4
3 Data Readings	5
3.1 Optical Displacement	5
3.2 Tilt Readings	5
4 Maintenance	6
5 Support	7
5.1 Troubleshooting - General	7
5.1.1 No new data from node	7
5.2 Contact Information	8
A Import / Export Restrictions	9
B Software Licenses	10
B.1 FreeRTOS	10
B.2 Newlib	13
B.3 GCC Runtime Library	19

Warnings



Warning

Protection provided by the equipment may be impaired if used in a manner contrary to this user manual.



This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device must accept any interference, and
2. This device must accept any interference received including interference that may cause undesired operation

Changes or modifications not expressly approved by Senceive Limited could void the user's authority to operate the equipment.

This equipment must be professionally installed.

Only the following antennas are to be used with the equipment:

Order Code	Manufacturer / Part Number	Gain
FA-FM-WPS	Linx ANT-2.4-CW-QW-SMA	1.1dBi
FA-FM-LPS	Siretta DELTA8A/x/SMAM/S/S/17	0dBi
FA-FM-ADJ	EAD FBKR35068-SM-KR	2dBi



This product must not be disposed of in the normal waste stream. It contains a battery pack and electronic components and so should be recycled appropriately.

In accordance with the WEEE guidelines, customers in the European Union may return the product free of charge for recycling at the end of its life. Contact your supplier for details.



Warning

This product contains a Class 2 laser. The user should avoid pointing the laser directly to the eye, while the device is powered ON.

Chapter 1

Overview

1.1 The FlatMesh System

A FlatMesh network consists of a number of nodes connecting to one gateway device. In some situations multiple networks may be required on a single site, for example a site in which the number of nodes exceeds the number supported by a single Gateway, or a site where there are a set of separate measurement zones.

A FlatMesh Node is a sensing unit with an integrated wireless mesh radio and battery. It participates in a FlatMesh wireless network, forwarding messages as required by the system, and also takes samples from onboard and/or external sensors. Sampling is done on a periodic schedule which may be either fixed or variable. In addition, a sample may be manually requested via the Gateway.

1.2 FlatMesh Optical Displacement Node (ODS)

The FlatMesh Optical Displacement Node provides the ability to measure distance between the node and a target. It also provides temperature and onboard battery voltage. The unit can optionally be configured with an internal tilt meter.

 **Note**

Readings can be scheduled anywhere between 15 seconds to twelve hours with a time increment of one second.

1.2.1 FM3N-LDS-IX(H) Physical Specification

Dimensions	90 x 90 x 60 mm
Total Mass	0.6 kg (approx.)
Housing Material	Die cast aluminium body
International Protection Marking	IP68 (1m for 24 hours)
Mounting Options	Horizontal magnetic / wall mount
Node Operating Temperature Range ¹⁾	-25°C to +70°C
Laser Operating Temperature Range ²⁾	-10°C to +50°C

1. The node will participate in the FlatMesh network and provide tilt and onboard sensor readings within this temperature range.
2. Laser displacement readings will only be available within this temperature range. The laser will not activate outside of this range.

1.2.2 Internal Battery

Battery Type	Lithium Thionyl Chloride, non-rechargeable
Nominal Voltage	3.6V
Nominal Capacity	19000mAh
Typical Battery Life	8 years at 30 minute reporting intervals, including when acting as a relay node. Consult with Senceive for your application.

1.2.3 FlatMesh Radio Specifications

Communication Type	Proprietary FlatMesh v3 Mesh Networking Protocols IEEE 802.15.4 compliant
Frequency Band	2400 - 2485 MHz ISM Band
Maximum Transmit Power	6.5dBm (EN 300 328 v1.8.1)
Maximum Antenna Gain	2.2dBi
Range	Up to 300m depending on the environment and fitted antenna Consult with Senceive for your application
RF Module	Senceive FM3Node

1.2.4 Optical Displacement Sensor Specification

Resolution	0.1 mm
Repeatability	± 0.15 mm
Range	50 meters (natural surface), 100 meters (white target), 150 meters (reflecting target)
Laser Type	Class 2, 655nm (visible red)

1.2.5 Tilt Sensor Specification

Resolution	0.0001° (0.00175mm/m)
Repeatability (-IX variant)	$\pm 0.0005^\circ$ (± 0.0087 mm/m)
Repeatability (-IXH variant)	$\pm 0.0025^\circ$ (± 0.0436 mm/m)
Range	$\pm 90^\circ$

Chapter 2

Installation

The node will be delivered to you pre-configured. Simply affix the node to a structure within the range of the rest of the network.

2.1 Mounting

The node must be securely mounted to a structure with the laser aperture pointing towards the object you wish to monitor. There are several mounting options available for accurately positioning Node.

**Warning**

The Optical Displacement Node with brackets could have a mass of up to 1.5kg. Please ensure that the object you are fixing to can handle this load.

Ensure that appropriate methods and materials are used when affixing equipment to a wall.

2.2 Targeting

With the laser aperture pointing in the desired direction, hold a magnet (supplied with unit) near the bottom of the lens. After 2 to 5 seconds, the targeting laser will activate. This laser will stay on until the magnet is removed. Make any required adjustments to the mounting position until the targeting laser is accurately pointing at the object you wish to monitor. Once the node is accurately positioned, remove the magnet and the node will return to its normal operating mode.

Chapter 3

Data Readings

3.1 Optical Displacement

The Optical Displacement node does not require any additional physical connections and will report displacement readings as soon as it connects to the FlatMesh network. The node reports the absolute displacement between the node the reference target in millimeters.

3.2 Tilt Readings

If a triaxial tilt sensor is fitted, the node will report tilt readings in the same manner as a standard FlatMesh tilt meter. Please see the FM3N-IX user guide for more information on the tilt functionality of the device.

Chapter 4

Maintenance

The product should not require any maintenance after installation.

If the need to clean the product should arise, use only a damp cloth and mild detergent. Do not use any solvents as this may damage the enclosure.



Warning

Only service personnel authorised by the manufacturer may open the enclosure.

No user serviceable parts are located inside.

Chapter 5

Support

5.1 Troubleshooting - General

FlatMesh Nodes are sealed units so checking of devices is confined to visual inspection, checking of connections and measurement of basic device parameters.

5.1.1 No new data from node

Check if other nodes on the same gateway have been updating

The FlatMesh Gateway operates a store-and-forward system. It collects data from nodes on its network all the time, and then periodically establishes a connection to the Web Monitor to transfer data.

Check the other nodes on the same gateway for similar problems to rule out a gateway problem. Check that the gateway battery has been charged correctly in the last two weeks. If the problem is being seen on a number of gateways on the same site, there could be a problem with the backhaul (cellular network or other network connection.)

Check for physical damage

Check to ensure that the node's enclosure is whole and undamaged.

The network relies on neighbouring nodes to pass messages along to the gateway. There is no reliance on any one node, but if all nodes in a large stretch of the network are not in working order, this is likely to impact other nodes' ability to communicate with the gateway.

Check that the antenna is tight

The antenna connects to the node through a threaded SMA connection. This should be tightened by hand against the connector on the enclosure. If this connector is loose, the node's signal strength and therefore its ability to connect to the network will be significantly impaired.

Check that the antenna is correctly oriented

The antenna's orientation can also impact its ability to connect to other nodes. Typically, the correct orientation for the antenna is vertical (perpendicular to the ground.) In tunnels or when monitoring a wall, it may be more appropriate to orient the antenna to be perpendicular to the wall surface. Check with Senceive to ascertain the best arrangement for your site.

5.2 Contact Information

For assistance and support, contact your supplier or the manufacturer:

Senceive Limited
Phone: +44 (0) 207 731 8269
Email: support@senceive.com
Web: <http://www.senceive.com>

Appendix A

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The products described in this user manual contain and use encryption algorithms for data authentication and security. Some countries require registration of these technologies. It is the importer's responsibility to comply with all local regulations. Contact Senceive for more information.

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iconv (Charset Conversion Library) v2.0

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